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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/780,500 | OH, BYONG MOK | |
| | **Examiner** | **Art Unit** | |
| | Crystal Murdoch | 2628 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *23 July 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-3,5-11,13-28 and 32-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-11,13-28 and 32-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

# DETAILED ACTION

## I. Response to Arguments

Applicant’s response to the last Office Action, mailed 30 July 2008 has been entered and made of record.

Claims 1-3, 5-11, 13-28, and 32-41 are pending in the application.

Applicant’s amendments to independent claims 1, 11, 22 and 38 are sufficient to overcome the rejection under 35 U.S.C. §101. Thus, this rejection is withdrawn.

Applicant's arguments filed 23 July 2009 have been fully considered but they are not persuasive.

Applicant’s argument is that “Seago does not teach modeling an object at all where the object occupies a field of view greater than 180 degrees,” and that “Seago’s method [of modeling an object] is inapplicable to the objects that occupy a field of view of more than 180 degrees (Remarks: 14),” for the following reasons:

- “The input to Seago's method is a 2-D perspective image or a group of 2-D images displaying the object to be modeled (See, e.g., Seago, col. 11, lines 45-47) (Remarks: 13).”
- “Seago determines vanishing points for the planar faces of the object using parallel lines on the object and then derives a 3D coordinate

system for the object using the vanishing points (See, Seago, steps 40 to 48, fig. 2.) (Remarks: 13)."

- "The features of the object are then modeled (See, Seago, step 50, fig. 2 and figs. 9-10.) (Remarks: 13)."

So whether or not the method of Seago can be applied to input images depends on whether or not "a 2-D perspective image or a group of 2-D images displaying the object to be modeled" are used as input. Szeliski teaches, "the user creates a small mosaic using a planar perspective motion model… (Szeliski: Col. 7, Lns. 10-13)." In other works, Szeliski is also using 2-D (planar) images that include perspective. As such, one of ordinary skill would be able to apply the method of Seago, which takes 2-D planar images, determines vanishing points to derive a 3D coordinate system, and models the objects within the images, to the teachings of Szeliski which also include use of 2D perspective images.

According to *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1739 (2007) at 1396, "if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." As established above, both Seago and Szeliski use 2D perspective images and one of ordinary skill would recognize how to create object models from the 2D

perspective images of Szeliski using the method of Seago. Examiner notes that the perspective information required to perform the method of Seago is not eliminated in Szeliski, regardless of whether the objects in the images occupy a field of view greater than 180 degrees. Therefore, Examiner maintains her position that the combination of Szeliski and Seago would have been obvious and teaches limitations for which they are cited.

## II. Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

A. Claims 22-28, 32-35, 38, and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Szeliski et al. (US Patent Number 6,157,747, herein referred to as Szeliski) in view of Seago (US Patent Number 5,990,900).

Regarding independent claim 22, Szeliski teaches a computerized method for projecting texture information onto an object within an image panorama (See Szeliski; Fig. 2B, Item 270; Col. 27, Lns. 62-66), the method comprising:

- Using the computer receiving instructions from a user identifying a three-dimensional geometric surface within an image panorama (See Szeliski: Col. 27-28, Lns. 62-2, respectively, wherein, “The shape of the model and the embedding of each face into texture space are left up to the user. This choice can range from something as simple as a cube with six separate texture maps, to something as complicated as a subdivided dodecahedron, or even a latitude-longitude tessellated globe.”),
  - The image panorama containing an object having one or more textures (See Szeliski: Col. 5, Lns. 27-35),
  - The object occupying a field of view of more than 180 degrees in the panorama (See Szeliski: Col. 5, Lns. 7-9, “By taking as many images as needed, image mosaics can be constructed which cover as large a field of view as desired, e.g., a complete environment map.”);
- Determining a directional vector from the three-dimensional geometric surface (See Szeliski: Fig. 15; Col. 22, Lns. 4-31);
- Using the computer creating a geometric model of the image panorama based at least in part on the three-dimensional geometric surface and the directional vector (See Szeliski: Col. 7, Lns. 29-33, “By mapping the mosaic onto an arbitrary texture-mapped polyhedron surrounding the origin, the virtual environment is viewed using

standard 3D graphics viewers and hardware (block 160) without requiring special purpose players." In Col. 22, Lns. 4-31, Szeliski teaches the direction vectors, which are used to align the images of the panoramic image. Thus, the geometric model of the visual scene is dependent on the geometric shapes of the surfaces of the polyhedron to be texture mapped, and the texture map applied to the surfaces of the polyhedron, which is the panoramic mosaic determined using the direction vectors.); and

- Applying the one or more textures to the object in the image panorama based on the geometric model (See Szeliski: Fig. 2B, Item 270; Col. 28, Lns. 13-15, wherein Szeliski teaches, "...efficiently computing texture map color values for any geometry and choice of texture map coordinates.").

Szeliski does not expressly suggest:

- Creating a geometric model includes identifying at least one boundary of the object and
- Using the identified boundary to associate geometry information with the object,
    - o The geometry information comprising 3-D coordinates describing the position and orientation of the object boundary in a reference coordinate system.

Seago is cited for teaching, “Line creation can be performed automatically by image analysis software, which determines edges of objects and creates lines overlapping the determined edges (See Seago: Col. 4, Line 65 - Col. 5, Line 1, respectively),” which correspond to identifying at least one boundary of the object. Seago also teaches, “Next, at blocks 50, shapes or polygons that define the selected object's sides, and plane indexes are determined based on user designated vertices or vanishing lines at significant features of the selected object (See Seago: Fig. 2, Item 50; Col. 5, Lns. 35-38),” which corresponds to using the boundary to associate geometry information with the object. Finally, Seago is cited for teaching, “Once all the polygons and plane indexes of a selected object have been determined, a three-dimensional object oriented within the selected object's three-dimensional coordinate space is determined (See Seago: Fig. 2, Item 54; Col. 5, Lns. 50-55),” which corresponds to the 3D coordinates describing the position and orientation of the object boundary in the reference coordinate system.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used the three-dimensional object editing abilities of Seago, to modify the three-dimensional environment map, as taught by Szeliski, because Seago is in the same field of endeavor of generating three-dimensional computer graphics using image

capture devices; and Seago expressly suggests that this method of object extraction produces accurate three-dimensional objects more efficiently than conventional systems that try to extract the three-dimensional objects using analytical mathematical interpretations and orthogonal image analysis (See Seago: Col. 11, Lns. 49-55). Moreover, Applicant has not alleged any reason in support of why extracting a 3D object from a 2D image panorama would be surprising or unexpected to one skilled in the pertinent art, or why there might have been some unexpected advantage in doing so. Applicant has provided no evidence to show that extracting 3D objects from 2D images with a view exceeding 180° was "uniquely challenging or difficult for one of ordinary skill in the art," (see *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (citing KSR, 127 S. Ct. at 419).

Regarding independent claim 32, the Szeliski teaches a system for creating a three dimensional model from a plurality of image panoramas, the system comprising:

- Means for receiving the image panoramas representing a visual scene (See Szeliski: Col. 27, Lns. 34-37, "Once a complete panoramic mosaic has been constructed, it is necessary to convert the set of input images and associated transforms into one or more images which can

be quickly rendered or viewed.") having an object (See Szeliski: Fig. 6, Item 610; Col. 11, Lns. 16-21);

  - The object occupying a field of view of more than 180 degrees in the panoramas (See Szeliski: Col. 5, Lns. 7-9, "By taking as many images as needed, image mosaics can be constructed which cover as large a field of view as desired, e.g., a complete environment map."),

- Means for allowing a user to interact with the system to determine a directional vector for each image panorama (See Szeliski: Col. 25, Lns. 64-66);
- Means for aligning the image panoramas relative to each other (See Szeliski: Fig. 17; Col. 23, Lns. 10-12, wherein minimizing the differences between ray directions aligns the images.).

Szeliski does not expressly suggest:

- Means for creating a three dimensional model from the aligned panoramas, wherein:
  - Creating a three dimensional model includes identifying at least one boundary of the object and
  - Using the identified boundary to associate geometry information with the object includes associating geometry information with the object,

- The geometry information comprising 3-D coordinates describing the position and orientation of the object boundary in a reference coordinate system.

Seago is cited for teaching:

- Means for creating a three dimensional model from the aligned panoramas (See Seago: Fig. 2; Col. 4, Lns. 23-25, "FIG. 2 illustrates the process by which the image converting system 20 generates a three-dimensional model or object from a single two-dimensional image."), wherein:
  - Creating a three dimensional model includes identifying at least one boundary of the object (See Seago: Col. 4, Line 65 - Col. 5, Line 1, respectively, "Line creation can be performed automatically by image analysis software, which determines edges of objects and creates lines overlapping the determined edges.") and
  - Using the identified boundary to associate geometry information with the object includes associating geometry information with the object (See Seago: Fig. 2, Item 50; Col. 5, Lns. 35-38, "Next, at blocks 50, shapes or polygons that define the selected object's sides, and plane indexes are determined based on user designated vertices or vanishing lines at significant features of the selected object."),

- The geometry information comprising 3-D coordinates describing the position and orientation of the object boundary in a reference coordinate system (See Seago: Fig. 2, Item 54; Col. 5, Lns. 50-55, “Once all the polygons and plane indexes of a selected object have been determined, a three-dimensional object oriented within the selected object's three-dimensional coordinate space is determined.”).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used the three-dimensional object editing abilities of Seago, to modify the three-dimensional environment map, as taught by Szeliski, because Seago is in the same field of endeavor of generating three-dimensional computer graphics using image capture devices; and Seago expressly suggests that this method of object extraction produces accurate three-dimensional objects more efficiently than conventional systems that try to extract the three-dimensional objects using analytical mathematical interpretations and orthogonal image analysis (See Seago: Col. 11, Lns. 49-55). Moreover, Applicant has not alleged any reason in support of why extracting a 3D object from a 2D image panorama would be surprising or unexpected to one skilled in the pertinent art, or why there might have been some unexpected advantage in doing so. Applicant has provided no evidence to show that

extracting 3D objects from 2D images with a view exceeding 180° was "uniquely challenging or difficult for one of ordinary skill in the art," (see *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (citing KSR, 127 S. Ct. at 419).

Independent claim 38 differs from independent claim 32 primarily in that claim 38 is directed toward the computerized method implemented on the system of claim 32. Claim 38 also differs from claim 32 in that it requires creating a three dimensional model of the visual scene from the image panorama using the reference coordinate system. Seago is cited for teaching, "Next, at block 42, an object contained within the digital image is selected for conversion into a three- dimensional object, and the selected object's orientation, or natural coordinate system, is approximately determined (See Seago: Fig. 2, Item 42; Col. 4, Lns. 46-49, wherein the reference coordinate system is the natural coordinate system.)." Therefore, the rationale of claim 32 is applied to claim 38.

Regarding claim 24, as it depends from claim 22, Szeliski teaches the three-dimensional geometric surface is one of a floor, a wall, or a ceiling (See Szeliski: Col. 27, Lns. 64-67, wherein the model can be a cube with six separate texture maps for each surface. Using an appropriate environment map would cause the top surface to be a ceiling, the bottom surface to be a floor, etc.).

Regarding claim 25, as it depends from claim 22, Szeliski teaches the directional vector is orthogonal to the planar surface (See Szeliski: Fig. 15; Col. 22, Lns. 4-6).

Regarding claim 26, as it depends from claim 22, Szeliski teaches the geometric model comprises depth information (See Szeliski: Figs. 27 and 30; Col. 28, Lns. 29-33).

Regarding claim 27, as it depends from claim 22, Szeliski teaches the texture information comprises color information (See Szeliski: Col. 28, Lns. 13-18).

Regarding claim 28, as it depends from claim 22, Szeliski teaches the texture information comprises luminance information (See Szeliski: Fig. 2B; Col. 5, Lns. 27-30, wherein luminance is inherent to environment maps and texture maps.).

Regarding claim 33, as it depends from claim 32, Szeliski teaches a system wherein the input images comprise two-dimensional images (See Szeliski: Figs. 3-4; Col. 9, Lns. 56-58, wherein a camera 310 having its optical center fixed at point C (FIG. 3) captures a sequence of 2D still images $I_0$, $I_1$, $I_2$, $I_{3...}$).

Regarding claim 34, as it depends from claim 32, Szeliski teaches the input images comprise three-dimensional images including geometry information (See Szeliski: Figs. 3-4 and 6; Col. 9, Lns. 56-62, wherein the camera captures a sequence of 2D still images ($I_0$, $I_1$, $I_2$, $I_3$.) as it pans, the center rays of these images being focused on 3D points ($P_0$, $P_1$, $P_2$, $P_{3...}$) at a focal length f from the optical center point C. The points $P_i$ are defined relative to a fixed 3D world coordinate system ($P_x$, $P_y$, $P_z$). Since the three-dimensional images correspond to the two-dimensional images which include depth information in the form of focal length. The geometry information is the inverted V shape shown in both figures 4 and 6.).

Regarding claim 35, as it depends from claim 32, Szeliski teaches aligning the image panoramas according to instructions received from a user (See Szeliski: Col. 27, Lns. 64-66).

Regarding claims 40 and 41, as they depend from claims 22 and 38, respectively, Szeliski teaches the object is a room and the at least one boundary of the object is the intersection of a wall of the room with the floor (See Szeliski: Col. 27, Lns. 64-67, wherein the model can be a cube with six separate texture maps for each surface. Using an appropriate environment map would cause the top surface to be a ceiling, the bottom surface to be a floor, etc.).

B. Claims 11, 13-21, 23, and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Szeliski and Seago, and in further view of Blank (US Patent Number 5,469,536).

Regarding independent claim 11, Szeliski teaches a computerized method of interactively editing objects in a panoramic image, the method comprising:

- Receiving an image panorama representing a visual scene (See Szeliski: Col. 27, Lns. 34-37, "Once a complete panoramic mosaic has been constructed, it is necessary to convert the set of input images and associated transforms into one or more images which can be quickly rendered or viewed."),
    - The image panorama having an object (See Szeliski: Fig. 6, Item 610; Col. 11, Lns. 16-21) and a point source (See Szeliski: Figs. 3-4 and 6; Col. 9, Lns. 56-62, wherein the camera captures a sequence of 2D still images ($I_0$, $I_1$, $I_2$, $I_3$.) as it pans, the center rays of these images being focused on 3D points ($P_0$, $P_1$, $P_2$, $P_{3...}$) at a focal length $f$ from the optical center point C."),
    - The object occupying a field of view of more than 180 degrees in the panorama (See Szeliski: Col. 5, Lns. 7-9, "By taking as many images as needed, image mosaics can be constructed which cover

as large a field of view as desired, e.g., a complete environment map.");

Szeliski does not expressly suggest:

- Using the computer creating a three dimensional model of the visual scene using features of the visual scene and the point source, wherein:
    - Creating a three dimensional model includes identifying at least one boundary of the object and
    - Using the identified boundary to associate geometry information with the object,
        - The geometry information comprising 3-D coordinates describing the position and orientation of the object boundary in a reference coordinate system.

Seago is cited for teaching:

- Creating a three dimensional model of the visual scene (See Seago: Fig. 2; Col. 4, Lns. 23-25, "FIG. 2 illustrates the process by which the image converting system 20 generates a three-dimensional model or object from a single two-dimensional image.") using features of the visual scene and the point source (See Seago: Fig. 2, Item 40; Col. 4, Lns. 34-37, "First, at block 40, a digitized two-dimensional perspective image of one or more objects is retrieved from memory 32

or a digital image input device 28 and displayed on the display device 24," wherein the features of the visual scene are the one or more objects and the point source is indicated by the perspective of the image.), wherein:

- Creating a three dimensional model includes identifying at least one boundary of the object (See Seago: Col. 4, Line 65 - Col. 5, Line 1, respectively, "Line creation can be performed automatically by image analysis software, which determines edges of objects and creates lines overlapping the determined edges.") and
- Using the identified boundary to associate geometry information with the object (See Seago: Fig. 2, Item 50; Col. 5, Lns. 35-38, "Next, at blocks 50, shapes or polygons that define the selected object's sides, and plane indexes are determined based on user designated vertices or vanishing lines at significant features of the selected object."),
    - The geometry information comprising 3-D coordinates describing the position and orientation of the object boundary in a reference coordinate system (See Seago: Fig. 2, Item 54; Col. 5, Lns. 50-55, "Once all the polygons and plane indexes of a selected object have been determined, a three-dimensional object oriented within the selected object's three-dimensional coordinate space is determined.").

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used the three-dimensional object editing abilities of Seago, to modify the three-dimensional environment map, as taught by Szeliski, because Seago is in the same field of endeavor of generating three-dimensional computer graphics using image capture devices; and Seago expressly suggests that this method of object extraction produces accurate three-dimensional objects more efficiently than conventional systems that try to extract the three-dimensional objects using analytical mathematical interpretations and orthogonal image analysis (See Seago: Col. 11, Lns. 49-55). Moreover, Applicant has not alleged any reason in support of why extracting a 3D object from a 2D image panorama would be surprising or unexpected to one skilled in the pertinent art, or why there might have been some unexpected advantage in doing so. Applicant has provided no evidence to show that extracting 3D objects from 2D images with a view exceeding 180° was "uniquely challenging or difficult for one of ordinary skill in the art," (see *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (citing KSR, 127 S. Ct. at 419).

The combination of Szeliski and Seago does not expressly suggest:

- Using the computer receiving an edit to the object in the panorama;

- Using the computer transforming the edit relative to a viewpoint defined by the point source; and
- Projecting the transformed edit onto the object.

Blank is cited for teaching trimming, which allows the user to trim off any undesired edges of an object to reveal the background below (See Blank: Col. 47, Lns. 11-20). It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have allowed modification of the colors within an image, as taught by Blank, to manipulate the colors within the images used to create the panoramic image mosaics, as taught by Szeliski, as modified by Seago, because it would enable the user to quickly and efficiently modify or enhance the appearance of an image to desired goal (See Blank: Col. 6, Lns. 23-28).

Independent claim 36 differs from independent claim 11 primarily in that claim 36 is directed toward the system for implementing the computerized method of claim 11. Claim 36 also differs in that it requires creating a three dimensional model includes identifying at least one boundary of the object and one or more interactive editing tools for providing an edit to the selected object. Seago teaches, "FIG. 2 illustrates the process by which the image converting system 20 generates a three-dimensional model or object from a single two-dimensional image (See Seago: Fig. 2; Col. 4, Lns. 23-25)," wherein "... at block 42, an object

contained within the digital image is selected for conversion into a three-dimensional object, and the selected object's orientation, or natural coordinate system, is approximately determined (See Seago: Fig. 2, Item 42; Col. 4, Lns. 46-49)," which corresponds to creating a three dimensional model includes identifying at least one boundary of the object. Blank is cited for teaching function calls, which correspond to the interactive editing tools for editing the selected object (See Blank: Col. 21, Lns. 18-23). Thus, the rationale of independent claim 11 is applied to independent claim 36.

Regarding claim 13, as it depends from claim 11, the rationale of claim 11 is incorporated herein. The combination of Szeliski, Seago, and Blank substantially teach the invention as claimed. Specifically, Blank teaches receiving an edit to color information associated with the object (See Blank: Col. 6, Lns. 29-47).

Regarding claim 14, as it depends from claim 11, the rationale of claim 11 is incorporated herein. The combination of Szeliski, Seago, and Blank substantially teach the invention as claimed. Specifically, Blank teaches receiving an edit to alpha information associated with the object (See Blank: Fig. 11; Col. 20, Lns. 61-66).

Regarding claim 15, as it depends from claim 11, the rationale of claim 11 is incorporated herein. The combination of Szeliski, Seago, and Blank substantially teach the invention as claimed. Specifically, Blank teaches receiving an edit to depth information associated with the object (See Blank: Col. 13, Lns. 8-16).

Regarding claim 16, as it depends from claim 11, the rationale of claim 11 is incorporated herein. The combination of Szeliski, Seago, and Blank substantially teach the invention as claimed. Specifically, Blank teaches receiving an edit to geometry information associated with the object (See Blank: Col. 47, Lns. 11-20).

Regarding claim 17, as it depends from claim 11, the rationale of claim 11 is incorporated herein. The combination of Szeliski, Seago, and Blank substantially teach the invention as claimed. Specifically, Blank teaches providing a user with an interactive drawing tool that specifies edits for the object and receiving the edits made by the user using the interactive drawing tool (See Blank: Col. 21, Lns. 18-23).

Regarding claims 18 and 37, as they depend from claims 17 and 36, respectively, the rationale of claim 11 is incorporated herein. The combination of Szeliski, Seago, and Blank substantially teach the

invention as claimed. Specifically, Blank teaches the interactive drawing tool is a depth chisel tool (See Blank: Col. 47, Lns. 11-20).

Regarding claim 19, as it depends from claim 17, the rationale of claim 11 is incorporated herein. The combination of Szeliski, Seago, and Blank substantially teach the invention as claimed. Specifically, Blank teaches the interactive drawing tool specifies a selected value for depth for the object (See Blank: Col. 22, Lns. 35-62).

Regarding claim 20, as it depends from claim 17, the rationale of claim 11 is incorporated herein. The combination of Szeliski, Seago, and Blank substantially teach the invention as claimed. Specifically, Blank teaches the interactive drawing tool incrementally adds to the depth for the object (See Blank: Col. 34, Lns. 8-11).

Regarding claim 21, as it depends from claim 17, the rationale of claim 11 is incorporated herein. The combination of Szeliski, Seago, and Blank substantially teach the invention as claimed. Specifically, Blank teaches the interactive drawing tool incrementally subtracts from the depth for the object (See Blank: Col. 34, Lns. 22-26).

The rationale of claim 17 is applied to claim 23.

C. Claims 1-3, 5-6, 8-10 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Szeliski in view of Luken (US Patent Number 5,923,334), and in further view of Seago.

Regarding independent claim 1, Szeliski teaches a computerized method for creating a three dimensional model from image panoramas, the method comprising:

- Receiving at a computer a plurality of image panoramas representing a visual scene (See Szeliski: Col. 27, Lns. 34-37, "Once a complete panoramic mosaic has been constructed, it is necessary to convert the set of input images and associated transforms into one or more images which can be quickly rendered or viewed.") and having an object (See Szeliski: Fig. 6, Item 610; Col. 11, Lns. 16-21),
    - The object occupying a field of view of more than 180 degrees in the panoramas (See Szeliski: Col. 5, Lns. 7-9, "By taking as many images as needed, image mosaics can be constructed which cover as large a field of view as desired, e.g., a complete environment map.");
- Using the computer, determining a directional vector for the image panorama, the directional vector indicating an orientation of the visual scene with respect to a reference coordinate system (See Szeliski: Fig. 15; Col. 22, Lns. 4-31);

- Transforming the image panoramas such that the directional vectors are substantially aligned relative to the reference coordinate system (See Szeliski: Fig. 15; Col. 22, Lns. 2-4, “FIG. 15 shows the adjustment of the bundle of rays $x_{jk}$ so that they converge to $x_j$.”);
- Aligning the transformed image panoramas to each other (See Szeliski: Fig. 17; Col. 23, Lns. 10-12, wherein minimizing the differences between ray directions aligns the images.).

Szeliski does not expressly suggest determining a directional vector for each image panorama. Luken is cited for teaching eight direction vectors D0-D7 associated with six rectangular images mapped to the inside of an octahedron (See Luken: Figs. 7-10, 14 and 17; Col. 7, Lns. 28-36, wherein it is determined which of the six rectangular images is intersected by one of the eight direction vectors.). It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used direction vectors for each image within an environment map that is mapped to the sides of an octahedron, as taught by Luken, with the three-dimensional model environment map of the visual scene, as taught by Szeliski, because Luken: (1) is directed to the same problem of using polyhedral environment maps to create and view three dimensional images from data representing multiple views of a scene; (2) is in the same field of endeavor of image processing systems;

and (3) Luken expressly suggests that the direction vectors provide an efficient system for generating and viewing three-dimensional panoramic images based environment maps, and offer an improved level of interactive graphical feedback (See Luken: Col. 3, Lns. 5-8).

The combination of Szeliski and Luken does not expressly suggest:

- Using the computer, creating a three dimensional model of the visual scene from the transformed and aligned image panoramas using the reference coordinate system, wherein
    - Creating a three dimensional model includes identifying at least one boundary of the object and
    - Using the identified boundary to associating associate geometry information with the object,
        - The geometry information comprising 3-D coordinates describing the position and orientation of the object boundary in the reference coordinate system.

Seago is cited for teaching:

- Using a computer, creating a three dimensional model of the visual scene (See Seago: Fig. 2; Col. 4, Lns. 23-25, “FIG. 2 illustrates the process by which the image converting system 20 generates a three-dimensional model or object from a single two-dimensional image.”) from the transformed and aligned image panoramas using the

reference coordinate system (See Seago: Fig. 2, Item 42; Col. 4, Lns. 46-49, "Next, at block 42, an object contained within the digital image is selected for conversion into a three-dimensional object, and the selected object's orientation, or natural coordinate system, is approximately determined," wherein the reference coordinate system is the natural coordinate system.), wherein

- Creating a three dimensional model includes identifying at least one boundary of the object (See Seago: Col. 4, Line 65 - Col. 5, Line 1, respectively, "Line creation can be performed automatically by image analysis software, which determines edges of objects and creates lines overlapping the determined edges.") and
- Using the identified boundary to associating associate geometry information with the object (See Seago: Fig. 2, Item 50; Col. 5, Lns. 35-38, "Next, at blocks 50, shapes or polygons that define the selected object's sides, and plane indexes are determined based on user designated vertices or vanishing lines at significant features of the selected object."),
  - The geometry information comprising 3-D coordinates describing the position and orientation of the object boundary in the reference coordinate system (See Seago: Fig. 2, Item 54; Col. 5, Lns. 50-55, "Once all the polygons and plane indexes of a selected object have been determined, a three-dimensional

> object oriented within the selected object's three-dimensional coordinate space is determined.").

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used the three-dimensional object editing abilities of Seago, to modify the three-dimensional environment map, as taught by Szeliski, as modified by Luken, because Seago is in the same field of endeavor of generating three-dimensional computer graphics using image capture devices; and Seago expressly suggests that this method of object extraction produces accurate three-dimensional objects more efficiently than conventional systems that try to extract the three-dimensional objects using analytical mathematical interpretations and orthogonal image analysis (See Seago: Col. 11, Lns. 49-55). Moreover, Applicant has not alleged any reason in support of why extracting a 3D object from a 2D image panorama would be surprising or unexpected to one skilled in the pertinent art, or why there might have been some unexpected advantage in doing so. Applicant has provided no evidence to show that extracting 3D objects from 2D images with a view exceeding 180° was "uniquely challenging or difficult for one of ordinary skill in the art," (see *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (citing KSR, 127 S. Ct. at 419).

Regarding claim 2, as it depends from claim 1, Szeliski teaches the directional vector is determined based, at least in part, on instructions identifying elements of the image panoramas received from a user (See Szeliski: Col. 8, Lns. 30-32 and Col. 27, Lns. 64-66).

Regarding claim 3, as it depends from claim 2, Szeliski teaches the instructions from the user identify two or more substantially parallel features in the image panoramas (See Szeliski: Col. 20, Line 64 – Col. 21, Line 6 and Lines 25-34).

Regarding claim 5, as it depends from claim 2, Szeliski teaches the instructions from the user identify a horizon line of at least one image panorama (See Szeliski: Fig 4: Col. 9, Lns. 54-62).

Regarding claim 6, as it depends from claim 2, Szeliski teaches the instructions comprise the identification of two or more areas of the image panoramas, each area containing one or more elements and further comprising automatically identifying the two elements contained in the two or more areas (See Szeliski: Fig. 6; Col. 20, Line 49 – Col. 21, Line 24, wherein a feature-based point correspondence is established between a pair of images by dividing each image into patches and identifying prospective “feature” points within the patches.).

Regarding claim 8, as it depends from claim 1, the rationale of claim 1 is incorporated herein. The combination of Szeliski, Luken, and Seago substantially teach the invention as claimed. Specifically, Luken teaches the image panoramas are aligned relative to the reference coordinate system such that the directional vector of each panorama is at least substantially parallel to one axis of the reference coordinate system (See Luken: Fig. 7, Item 707; Col. 6, Line 40—Col. 7, Line 36).

Regarding claim 9, as it depends from claim 1, the rationale of claim 1 is incorporated herein. The combination of Szeliski, Luken, and Seago substantially teach the invention as claimed. Specifically, Luken teaches the image panoramas are aligned relative to the reference coordinate system such that the directional vector of each panorama is at least substantially orthogonal to one axis of the reference coordinate system (See Luken: Fig. 6A and 7, Item 707; Col. 6, Line 40—Col. 7, Line 36, wherein since the six rectangular images are axis aligned, then a directional vector that is parallel to one axis must be perpendicular to the other two spatial axes. In other words, in order for a directional vector to intersect one of the rectangular images, that vector must be substantially parallel to one axis, which requires it to be substantially perpendicular to the others.).

Regarding claim 10, as it depends from claim 1, Szeliski teaches the image panoramas are aligned according to instructions received from a user (See Szeliski: Col. 27, Lns. 64-66, wherein the user aligns the image panoramas into texture space.).

Regarding claim 39, as it depends from claim 1, Szeliski teaches the object is a room and the at least one boundary of the object is the intersection of a wall of the room with the floor (See Szeliski: Col. 27, Lns. 64-67, wherein the model can be a cube with six separate texture maps for each surface. Using an appropriate environment map would cause the top surface to be a ceiling, the bottom surface to be a floor, etc.)

D. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Szeliski, Luken, and Seago, and in further view of Blank.

Regarding claim 7, as it depends from claim 6, the combination of Szeliski, Luken and Seago does not expressly suggest using edge detection to automatically identify the two elements. Nevertheless, Blank teaches detecting the edges of an object and separates portions of the image that are outside the edge of the object (i.e., the background component) from portions of the image that are inside the edge (See Blank: Col. 4, Lns. 17-21). The two elements are therefore identified as

those elements within the edge, and those outside the edge. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used the edge detection methods, as taught by Blank, as an alternative to patch-based division, as taught by Szeliski, as modified by Luken, because it is an effective way to divide the image into smaller portions to conquer aligning all aspects of an image.

## III. Conclusion

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Crystal Murdoch whose

telephone number is (571) 270-1043. The examiner can normally be reached on Mon. - Fri. 10:00 am to 6:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Crystal Murdoch/
Examiner, Art Unit 2628

/Ulka Chauhan/

Supervisory Patent Examiner, Art Unit 2628